



Land Acknowledgement: <https://www.ucalgary.ca/indigenous/cultural-teachings/territorial-land-acknowledgement>

Course Number: ARCH 404

Course Name: Architecture and Life Cycle Thinking: Climate Change and Beyond

Classroom: [REDACTED]

Instructor: Dr. Getachew Assefa

- Email: gassefa@ucalgary.ca
- Phone: [REDACTED]
- Office Hours and Location: [REDACTED] by appointment via e-mail
- Instructor Email Policy: Please note that all course communications must occur through your @ucalgary email, and I will respond to emails sent via students' @ucalgary emails within 48 hours excluding weekends and statutory holidays.

Teaching Assistant: Nolan Miranda

- Email: nolan.miranda@ucalgary.ca

Class Dates: Mandatory in-person classes: Tuesdays 11:00am to 12:50pm; Thursdays 11:00 to 11:50am, January 13 – April 14

Course Description:

This course focuses on introduction to strategies for comparing performance of buildings and building products/aspects based on contributions to climate change and other environmental impacts. Concepts of circular economy, life cycle analysis, embodied energy, recycling/reuse of building materials are explored through the lenses of impacts such as resource depletion, carbon and water footprints, and waste generation.

In this course, students will learn about the factors that make some buildings and building products superior to alternatives in terms of life cycle environmental performance. Using the circular economy concept as a platform, the course explores life cycle perspective of building design in the selection of materials and energy; design considerations for disassembly, reuse and recycling of materials and products; and repurposing of building products for multiple uses in the same product or another life in new products; and repurposing of whole buildings. Embodied, operating and demolition stages of buildings will be examined using relevant environmental sustainability metrics. The course integrates

lectures with guest speakers, site visits, a group project, and an individual paper to connect theory with real-world practice. These combined methods ensure students not only understand key sustainability concepts but also apply them in analytical and design-focused contexts. Students pursuing or aspiring design profession will benefit from understanding, measuring and doing elements of the course that are central to the lectures, guest lectures, assignments and project.

- Academic Calendar description: <https://calendar.ucalgary.ca/courses/1651621>
- Course Hours: 3 units; (2-1T)

Requisites: See [Section 3.3.5](#) of the Academic Calendar for more information regarding School of Architecture, Planning and Landscape courses.

- Prerequisite(s): ARCH 201
- Corequisite(s): none

Course Delivery:

- In-person Delivery

Course Learning Outcomes:

Upon completion of this course, students will know and be able to:

1. Describe and explain the principles of life-cycle thinking and life-cycle assessment.
2. Interpret and articulate the life-cycle performance of buildings within the context of architectural design.
3. Analyze material and energy flows in buildings from a life-cycle perspective, including their contributions to climate change and other environmental impacts.
4. Explain and evaluate the challenges and opportunities of applying life-cycle assessment using product category rules (PCRs) and environmental product declarations (EPDs), particularly for rating and certifying building materials and buildings.

Learning Resources:

- Required readings, textbooks, and learning materials:
 - Bowick, M., O'Connor, J., Meil, J., Salazar, J. (2021). *Guidelines for Whole-building LCA*. National Research Council Canada: Ottawa, ON. 106 pp. [Full Text Available on D2L]
 - Additional readings will also be provided separately as a list on D2L.
- Technology requirements:
- D2L will be used as a course platform. Menti will be used as a tool for interactive sessions.
- Revit BIM Model will be used for the project (can be accessed from Autodesk with a student account).
- To successfully engage in their learning experiences at the University of Calgary, are required to have reliable access to the following technology:

- A computer with a supported operating system, as well as the latest security, and malware updates;
- A current and updated web browser;
- Webcam (built-in or external);
- Microphone and speaker (built-in or external), or headset with microphone;
- Current antivirus and/or firewall software enabled;
- Broadband internet connection
- Most current laptops will have a built-in webcam, speaker and microphone.
- [Student IT Resources](#)

Special Budgetary Requirements:

None.

Additional Classroom Conduct and Related Information:

- **Code of Conduct:** The SAPL Studio spaces and other SAPL/University-provided facilities and equipment are governed by the [University's Student Non-Academic Misconduct Policy](#). Professional and courteous behavior is expected at all times. For more information, please refer to [Appendix 1: Prohibited Conduct](#), including the following categories: 1. Protection of Individuals; 2. Protection of Property; 3. Protection of University Functions, Activities and Services; 4. False Information and Identification; 5. Possession or Use of Dangerous Objects, Drugs or Alcohol; 6. Aiding in the Commission of an Offence; 7. Contravention of Other Laws and University Policies; and 8. Failure to Comply with a Sanction.
- **Communication with Instructor(s) Outside of Class Time:** To communicate with the Instructor(s) outside of class time, please use your UCalgary email account (unless otherwise noted). Email is a widely used professional communication tool. Please specify the course name and section number in the subject line of all emails, ARCH 404. Please ensure you check spelling, grammar, salutations, and other professional etiquette requirements for email communications. Instructors will not respond to emails that do not contain this information. Please provide at least two (2) business days for the Instructor(s) to reply. While email is most commonly used by students to communicate with their Instructors, it can sometimes limit the effectiveness of communication and may not be the best way for to answer all student questions. When replying, if the Instructor determines that communicating via email is not optimal, they may request a phone call or a virtual/in-person meeting.

Assessment Components:

The University policy on grading and related matters is described in [F.1](#) and [F.2](#) of the Academic Calendar. In determining the overall grade in the course, the following weights will be used:

Assessment Method		Description	Weight	Aligned Course Learning Outcome
Quizzes		Five multiple choice quizzes on D2L (top 4 quizzes each worth 5% will be graded)	20%	1,2,3,4
Review (R)		Individual written submission	10%	1,2,3,4
Project	PC1. Component 1 – Goal and scope -Inventory of materials, energy and transport	Group written submission	15%	3
	PC2. Component 2– Life cycle impact assessment results	Group written submission	15%	3
	PC3. Component 3– Interpretation and analysis	Group oral presentation and PowerPoint submission	15%	3
	Individual contribution and reflection of group project	Individual written submission	5%	1,2,3,4
	Peer review of all groups based on desk critique	Peer review form- group submission covering all groups	5%	1,2,3,4
	Peer mark	Confidential individual submission covering group members	5%	
Attendance and participation in class discussions, group work in class, and threads created and replied to on D2L' Discussion Forum.		Group discussion and D2L Individual submission	10%	1,2,3,4

- Assessment and Evaluation Information:
 - If a student misses (or is late for) a required component of the course for a valid excuse or absence, they must contact the instructor in writing within 24 hours to discuss applicable options to submit and/or make-up for that component.
 - Alternate arrangements for missed in-person assessments with a valid excuse will be made on a case-by-case basis at the discretion of the Instructor and upon review of the student's class participation and attendance record.
 - For example, students who have missed an in-person assessment (e.g., oral presentation) as a result of an excused absence may be asked—*if applicable to the assessment*—to submit a self-recorded video (via Zoom's auto-record feature) in lieu of an in-person engagement.
 - For assessments submitted online (e.g., D2L), late assignments *with a valid excuse* may be considered for grading without penalty at the discretion of the Instructor and upon review of the student's class participation and attendance record. Otherwise, the course's standard grade penalties (indicated below) will apply.
 - For assessments submitted online (e.g., D2L), all late assignments *without a valid excuse* will lose a letter grade (e.g., A- to B-) every 24 hours after the submission date/time. Late assignments submitted more than four days late constitute an automatic zero (0).
 - Missed in-person assessments (e.g., oral presentation, exam, etc.) as a result of an *unexcused* absence will receive an automatic zero (0).
- Attendance and Participation Expectations:
 - Students are expected to attend and come prepared to meaningfully engage in all class sessions. This includes producing or preparing content necessary for discussion and contributing to individual and class-wide discussions and/or conversations/assessments with the Course Instructor.
 - **Excused Absences:** In the event of an exceptional circumstance (e.g., illness, bereavement, etc.) or an exceptional opportunity (e.g., varsity athletic competition, national conference or awards ceremony, pow wow, etc.) up to four excused absences (for courses that meet twice or more per week) and up to two excused absences (for courses that meet once per week) are allowable per semester before jeopardizing one's own course grade and ability to pass the course. However, any such arrangements must be approved by the Instructor with advance notice by the student.
 - **Unexcused Absences:** Attendance at all class sessions and participation in all assessments is mandatory. Unexcused absences in excess of two per semester (for courses that meet twice per week) and one per semester (for courses that meet once per week) are grounds for failure in the course.
 - **Total Number of Absences:** The combined total number of excused AND unexcused absences per semester cannot exceed four per semester (for courses that meet twice

per week) or two per semester (for courses that meet once per week). Any number in excess are grounds for failure in the course.

- Guidelines for Submitting Assignments:
 - All assignments (e.g., projects, papers, presentations, etc.) must be turned in on time.
 - Please submit all assignments electronically through Dropbox in D2L. Assignments may be submitted in PDF format (unless otherwise stated). Assignments should have a file name as follows: “Coursenumber_semester_Lastname-Firstname_assignment-title” (e.g., ARCH 404_W26_Smith-Alex_Plan-Drawings).
 - Students are responsible for ensuring that all submitted digital files are in the correct format, complete, and accessible. Submissions that are corrupt, empty, incorrect (e.g., wrong file type), or inaccessible may receive a grade of zero. It is not the Instructor’s responsibility to verify or notify students of submission errors. Students are encouraged to double-check their uploads and retain confirmation of successful submission.
 - **Late Assignments:** Please see above for the course’s policy on late assignments/assessments
- Final Examinations:
 - There is no final exam in this course.
- Expectations for Writing:
 - Please see the “Copyright and Legislation” Section of the University of Calgary Policies and Supports for information on the use of AI in this course.
 - Section E.2 Writing Across the Curriculum:
<https://calendar.ucalgary.ca/pages/2c2d1ce47b8c4d008aec9cc3da49876e>
- Criteria that must be met to pass: Students will be evaluated based on their cumulative performance across all course components. There is no requirement to achieve a passing grade on each individual component, provided the overall cumulative grade meets the passing threshold.

Flexible Grade Option (CG Grade):

As per [Section 3.5.1](#) of the Academic Calendar, the School of Architecture, Planning and Landscape will not permit the Flexible Grade Option (CG Grade) for any course offered by the School, with the exception of the following courses:

- Architecture 201
- Landscape Architecture 201
- Planning 201

Grading Scale:

Based on [Section F.1.1](#) of the Academic Calendar

Grade	Grade Point Value	4-Point Range	Percent	Description
A+	4.00	4.00	95-100	Outstanding performance
A	4.00	3.85-4.00	90-94.99	Excellent performance
A-	3.70	3.50-3.84	85-89.99	Approaching excellent performance
B+	3.30	3.15-3.49	80-84.99	Exceeding good performance
B	3.00	2.85-3.14	75-79.99	Good performance
B-	2.70	2.50-2.84	70-74.99	Approaching good performance
C+	2.30	2.15-2.49	65-69.99	Exceeding satisfactory performance
C	2.00	1.85-2.14	60-64.99	Satisfactory performance
C-	1.70	1.50-1.84	55-59.99	Approaching satisfactory performance. Minimum grade requirement for SAPL prerequisite courses.
D+	1.30	1.15-1.49	50-54.99	Marginal pass. Insufficient preparation for subsequent courses in the same subject.
D	1.00	0.50-1.14	45-49.99	Minimal Pass. Insufficient preparation for subsequent courses in the same subject.
F	0.00	0-0.49	0-44.99	Failure. Did not meet course requirements.

Topic Areas and Detailed Class Schedule:

Course Schedule Date	Topic	Learning Activity	Assignments/Due Dates
Jan 13 (Tu)	L1: Course introduction+ Goal and Scope phase of LCA	Lecture	
	REVIT Model	Project	
Jan 15 (Th)	In-Class Discussion Lab 1	Group discussion	
Jan 20 (Tu)	L2: Life cycle perspective of building design + Life	Lecture	

	Cycle inventory phase of LCA		
	Tally + Project time	Project	
Jan 22 (Th)	In-Class Discussion Lab 2	Group discussion	
Jan 27 (Tu)	L3: Circular economy concepts and tools + Life Cycle Impact Assessment phase of LCA	Lecture	
	Project time	Project	
Jan 29 (Th)	In-Class Discussion Lab 3	Group discussion	
Feb 3 (Tu)	L4: Climate change	Lecture	In-Class D2L based Quiz 1: L2 and L3
	Project time	Project	
Feb 5 (Th)	In-Class Discussion Lab 4	Group discussion	
Feb 10 (Tu)	L5: Resource depletion, Land Use, Water and waste generation + Interpretation and Analysis phase of LCA	Lecture	
	Project time	Project	
Feb 12 (Th)	In-Class Discussion Lab 5	Group discussion	
Feb 17	No classes – term break		
Feb 19	No classes – term break		
Feb 24 (Tu)	L6: Acidification, Eutrophication and other environmental impacts	Lecture	In-Class D2L based Quiz 2: L4
	Project time	Project	
Feb 26 (Th)	In-Class Discussion Lab 6	Group discussion	
Project component 1 (goal and scope and inventory) submission			Feb 27 (Fr) 11:59pm
Mar 3 (Tu)	L7: Materials in buildings	Lecture	In-Class D2L based Quiz 3: L5 and L6
	Project time	Project	
Mar 5 (Th)	In-Class Discussion Lab 7	Group discussion	
Individual Review submission			Mar 5 (Th) 11:59pm
Mar 10 (Tuesday)	L8: Energy in buildings	Lecture	In-Class D2L based Quiz 4: L7
	Project time	Project	
Mar 12 (Thursday)	GL1: Architectural design workflow	Guest Lecture	TBD
Project component 2 (impact assessment results) submission			Mar 16 (M) 11:59pm
Mar 17 (Tuesday)	GL2: Passive Houses and Sustainable Buildings	Guest Lecture	Frank Crawford - TBC

Mar 19 (Th)	L9: Communicating environmental performance and benchmarking	Lecture	In-Class D2L based Quiz 5: L8
	Project time		
Mar 24 (Tu)	GL3: Climate declaration and Energy declaration in design of buildings in Sweden	Guest Lecture	Tove Malmqvist Stigell-TBC
	Project time	Project	
Mar 26 (Th)	Desk critique – peer review of projects – based on project 2 and draft project 3	Review	
Peer review feedback submission of all groups based on desk critique			Mar 27 (F) 11:59pm
Mar 31 (Tu)	Tour - MacKimmie Tower	Tour	TBC
Apr 2(Th)	Tour - EEEL Building	Tour	TBC
Apr 7 (Tu)	GL4: MacKimmie Tower	Guest Lecture	Dialog - TBC
	Project time		
Apr 9 (Th)	Project Time	Project	
Project component 3(interpretation & analysis) submission: PowerPoint file			Apr 7 (M) 11:59pm
Apr 14 (Tu)	Presentation		
Individual contribution and reflection of group project submission			Apr 14 (Tu) 11:59pm
Peer mark submission			Apr 14 (Tu) 11:59pm

Scheduled Out-of-Class Activities:

Two on campus tours: MacKimmie Tower (Mar 31) and EEEL Building (Apr 2).

University of Calgary Policies and Supports:

ACADEMIC ACCOMMODATION

<https://ucalgary.ca/student-services/access/prospective-students/academic-accommodations>

It is the student's responsibility to request academic accommodations according to the University policies and procedures listed below. The student accommodation policy can be found at:

<https://www.ucalgary.ca/legal-services/university-policies-procedures/student-accommodation-policy>

Students needing an accommodation because of a disability or medical condition should communicate this need to Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities: <https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Accommodation-for-Students-with-Disabilities-Procedure.pdf>

Students needing an accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, preferably in writing, to their instructor (contact information on first page above).

[Student Accessibility Services](#) will process the request and issue letters of accommodation to instructors. For additional information on support services and accommodations for students with disabilities, visit www.ucalgary.ca/access/.

ACADEMIC MISCONDUCT

Academic Misconduct refers to student behavior which compromises proper assessment of a student's academic activities and includes: cheating; fabrication; falsification; plagiarism; unauthorized assistance; failure to comply with an instructor's expectations regarding conduct required of students completing academic assessments in their courses; and failure to comply with exam regulations applied by the Registrar.

For information on the Student Academic Misconduct Policy and Procedures please visit:

- Student Academic Misconduct Policy: <https://www.ucalgary.ca/legal-services/university-policies-procedures/student-academic-misconduct-policy>
- Student Academic Misconduct Procedure: <https://www.ucalgary.ca/legal-services/university-policies-procedures/student-academic-misconduct-procedure>

Additional information is available on the Academic Integrity Website at <https://www.ucalgary.ca/student-services/student-success/learning/academic-integrity>.

COPYRIGHT LEGISLATION

All students are required to read the University of Calgary policy on Acceptable Use of Material Protected by Copyright (<https://www.ucalgary.ca/legal-services/university-policies-procedures/acceptable-use-material-protected-copyright-policy>) and requirements of the Copyright Act (<https://laws-lois.justice.gc.ca/eng/acts/C-42/index.html>) to ensure they are aware of the

consequences of unauthorised sharing of course materials (including instructor notes, electronic versions of textbooks, etc.). Students who use material protected by copyright in violation of this policy may be disciplined under the Non-Academic Misconduct Policy (<https://www.ucalgary.ca/legal-services/university-policies-procedures/student-non-academic-misconduct-policy>).

Notice to Students Regarding Use of Generative Artificial Intelligence (AI) Applications and Tools in Learning Environments

- **Some Use Permitted:** Students may use generative AI tools in this course in accordance with the instructions and guidelines outlined for each course assignment or assessment. The use of generative AI tools must be referenced and cited following citation instructions outlined by the course instructor. Use of generative AI outside assessment or assignment guidelines or without citation will constitute academic misconduct. It is the student's responsibility to be clear on the limitations on the use of generative AI tools for each assessment or assessment, on the expectations for citation and referencing, and on fact checking statements created by generative AI tools. If you are in doubt as to the use of generative AI tools in this course, please discuss your situation with the course instructor.
 - AI tools can be used for creating assignment outlines or critiquing drafts, but the final work must be original.
 - AI tools may be prohibited for tests, major assignments, or research papers but allowed for information gathering.

INSTRUCTOR INTELLECTUAL PROPERTY

Course materials created by instructors (including presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the instructor. These materials may NOT be reproduced, redistributed or copied without the explicit consent of the instructor. The posting of course materials to third party websites such as note-sharing sites without permission is prohibited. Sharing of extracts of these course materials with other students enrolled in the course at the same time may be allowed under fair dealing.

PROTECTION OF PRIVACY ACT

The University of Calgary (University) respects your privacy and is committed to ensuring the privacy of all students, staff, and community members. UCalgary's collection, use, and disclosure of your personal information is authorized under section 4(c) of the Alberta [Protection of Privacy Act](#) (POPA). It will be collected, used and disclosed as permitted under POPA and in accordance with the University's [Privacy Policy](#) and [Notice of Collection, Use and Disclosure of Student Personal Information](#). All student assignments and personal information provided to your course instructor will remain confidential unless otherwise stated before submission. It will not be disclosed to anyone else without your permission unless permitted under POPA.

SEXUAL AND GENDER-BASED VIOLENCE POLICY

The University recognizes that all members of the University Community should be able to learn, work, teach and live in an environment where they are free from harassment, discrimination, and violence. The University of Calgary's Sexual and Gender-Based Violence Policy guides us in how we respond to incidents of sexual and/or gender-based violence, including supports available to those who have experienced or witnessed sexual/gender-based violence, or those who are alleged to have committed sexual/gender-based violence. It provides clear response procedures and timelines, defines complex concepts, and addresses incidents that occur off-campus in certain circumstances. Please see the policy available at <https://www.ucalgary.ca/legal-services/university-policies-procedures/sexual-and-gender-based-violence-policy>.

UNIVERSITY STUDENT APPEALS OFFICE

If a student has a concern about a grade that they have received, they should refer to Section I of the Undergraduate Calendar (<https://calendar.ucalgary.ca/uofcregs/university-regulations/reappraisal-term-work>) which describes how to have a grade reappraised.

OTHER IMPORTANT INFORMATION

Please visit the Registrar's website at <https://www.ucalgary.ca/registrar/registration/course-outlines> for additional important information on the following:

- Wellness and Mental Health Resources
- Student Success
- Student Ombuds Office
- Student Union (SU) Information
- Graduate Students' Association (GSA) Information
- Emergency Evacuation/Assembly Points
- Safewalk